

Electrical Safety

CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid any shock hazard, you should disconnect all power cords and cables as described in the following information.

For your safety, always do the following *before* removing the cover:

1. Turn off the system unit and any attached devices, such as printers, displays, and external drives.

Note: Industrial computer users in the United Kingdom who have a modem or fax machine attached to your system unit must disconnect the telephone line from the system unit *before* unplugging any power cords (also known as power cables). When reassembling the system unit, reconnect the telephone line *after* plugging in the power cords.

2. Unplug all the power cords from electrical outlets.
3. Disconnect all communication cables from external receptacles.
4. Disconnect all cables and power cords from the back of the system unit.

Note: Do not reconnect any cables or power cords until you reassemble the system unit and put the cover back on.

CAUTION:

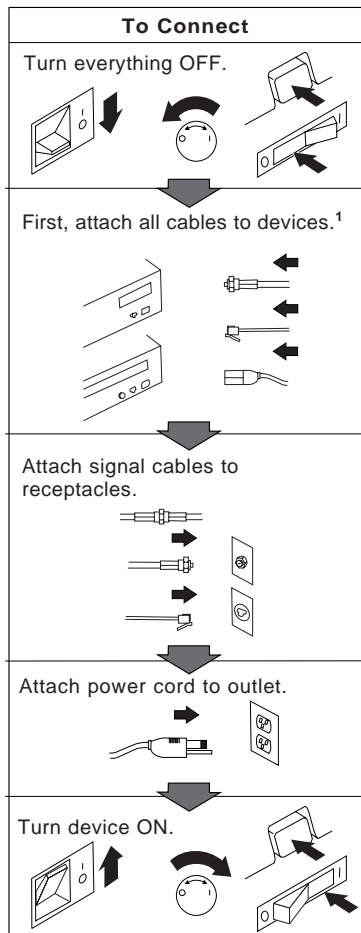
Never remove the cover on the power supply. If you have a problem with the power supply, have your system unit serviced.

CAUTION:

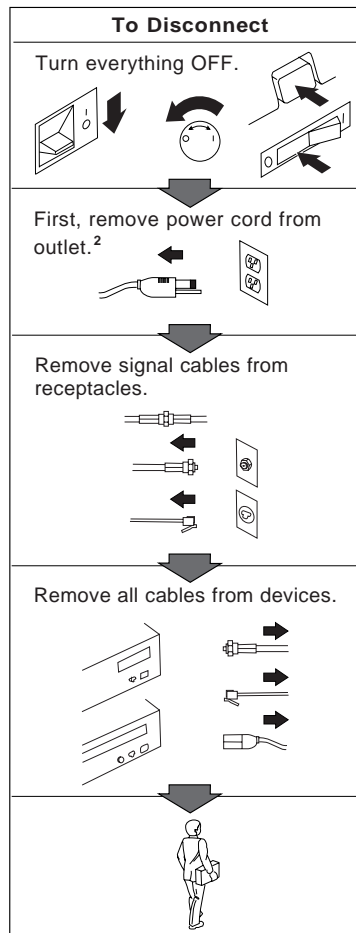
The system unit with options can weigh as much as 15 kilograms (33.3 pounds). Do not attempt to lift it by yourself if you think it is too heavy for you.

**DANGER:**

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly grounded outlet.



¹ In the U.K., by law, the telephone cable must be connected after the power cord.



² In the U.K., by law, the power cord must be disconnected after the telephone line cable.

Observe the following rules when working on electrical equipment.

Important

Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing main units
- Before you start to work on the system unit, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the system unit and to lock the wall box in the off position.
- If you need to work on a system unit that has *exposed* electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.

Remember: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and system unit frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and system unit damage.

- Do not service the following parts (and similar units) *with the power on* when they are removed from their normal operating places in a system unit (this practice ensures correct grounding of the units):
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators
- If an electrical accident occurs:
 - **Use caution; do not become a victim yourself.**
 - **Switch off power.**
 - **Send another person to get medical aid.**

Safety Inspection Guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each system unit, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the system unit. Disconnect the power cord.
3. Check the power cord for:
 - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
 - b. The power cord should be the appropriate type as specified in the parts listings.
 - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling Electrostatic-Discharge-Sensitive Devices

Any system unit part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the system unit, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

Note: The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the AC plug on AC-operated system units.

Grounding Requirements

Electrical grounding of the system unit is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Laser Compliance Statement

The CD-ROM drive in the Personal Computer is a laser product. The CD-ROM drive's classification label (sample shown below) is located on the drive.

	CLASS 1 LASER PRODUCT LASER KLASSE 1 LUOKAN 1 LASERLAITE APPAREIL A LASER DE CLASSE 1 KLASSE 1 LASER APPARAT
Note: Do not open the drive; no user adjustments or serviceable parts are inside.	

The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products.

In other countries, the drive is certified to conform to the requirements of EN60825.

Class 1 laser products are not considered to be hazardous. The CD-ROM drive has an internal Class I (1), 0.5-milliwatt, aluminum gallium-arsenide laser that operates at a wavelength of 760 to 810 nanometers.

The design of the laser system and the CD-ROM drive ensures that there is no exposure to laser radiation above a Class 1 (1) level during normal operation, user maintenance, or servicing conditions.

German Power Switch Statement

The 7587 Industrial Computer power switch is marked with a “–” for On and an “O” for Off.

Der 7587 Hauptschalter ist mit einem “–” für ein-, und einem “O” für ausgeschalten versehen.

Power Cord Notice

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should be marked <HAR> and have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country are usually available only in that country:

IBM Power Cord Part Number	Used in These Countries
13F9940	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa
13F9979	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
13F9997	Denmark
14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0033	Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0051	Liechtenstein, Switzerland
14F0069	Chile, Ethiopia, Italy, Libya, Somalia
14F0087	Israel
1838574	Thailand
62X1045	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Surinam, Taiwan, Trinidad (West Indies), United States of America, Venezuela

Appendix B. System Records

Use the following tables to keep a record of important information about your system unit. This information can be helpful when you install additional options in your system unit or if you ever need to have your system unit serviced.

Table B-1. System Unit Identification Numbers

Industrial Computer Type/Model	_____
Industrial Computer Serial Number	_____
Key Serial Number	_____
Key Address	_____

Table B-2. Internal and External Drives

Location	Drive Description	SCSI ID
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: If you attach a drive or other device to a SCSI adapter, be sure to record the expansion slot number of the adapter in the location field of this table.

Table B-3. Internal and External Options

Location	Option Description
Processor Type	<u>Pentium</u> _____ <u>Other:</u> _____
Bank 1	
Memory (MEM1)	<u>8MB Kit</u> _____ <u>16MB Kit</u> _____ <u>32MB Kit</u> _____
Memory (MEM2)	<u>8MB Kit</u> _____ <u>16MB Kit</u> _____ <u>32MB Kit</u> _____
Bank 2	
Memory (MEM3)	<u>8MB Kit</u> _____ <u>16MB Kit</u> _____ <u>32MB Kit</u> _____
Memory (MEM4)	<u>8MB Kit</u> _____ <u>16MB Kit</u> _____ <u>32MB Kit</u> _____
Cache Memory	<u>256KB Kit</u> _____ <u>512KB Kit</u> _____
Power Supply	<u>200 Watt</u> _____ <u>Other:</u> _____
Mouse Connector	<u>IBM Mouse</u> _____ <u>Other:</u> _____
Keyboard Connector	<u>Space Saving</u> _____ <u>Enhanced</u> _____ <u>Other:</u> _____
Display Connector	_____
Expansion Slot 1 (ISA/PCI)	_____
Expansion Slot 2 (ISA/PCI)	_____
SBC	_____
Expansion Slot 3 (ISA)	_____
Expansion Slot 4 (ISA)	_____
Parallel Connector	_____
Serial Connector A	_____
Serial Connector B	_____

Appendix C. 7587 Industrial Computer Physical Dimensions

Front View of 7587 Industrial Computer

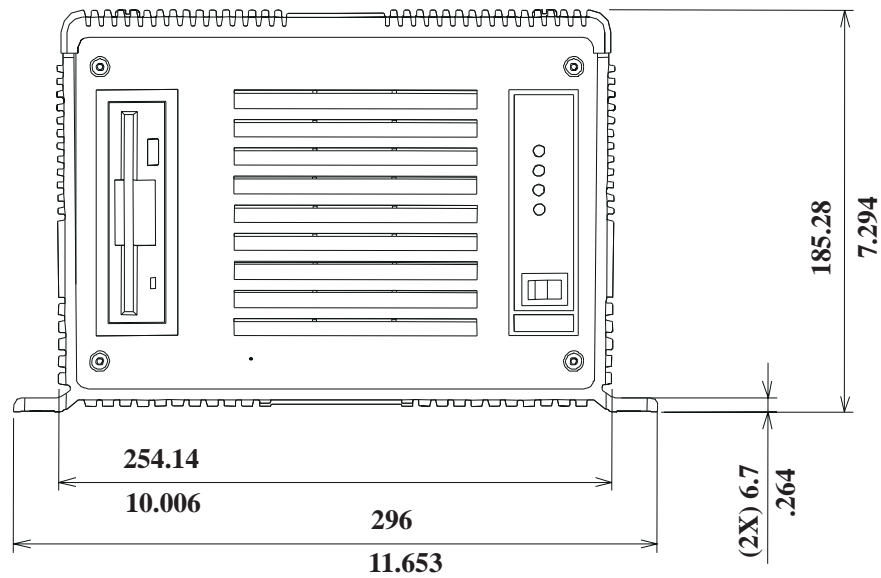


Figure C-1. Front View

Top View of 7587 Industrial Computer

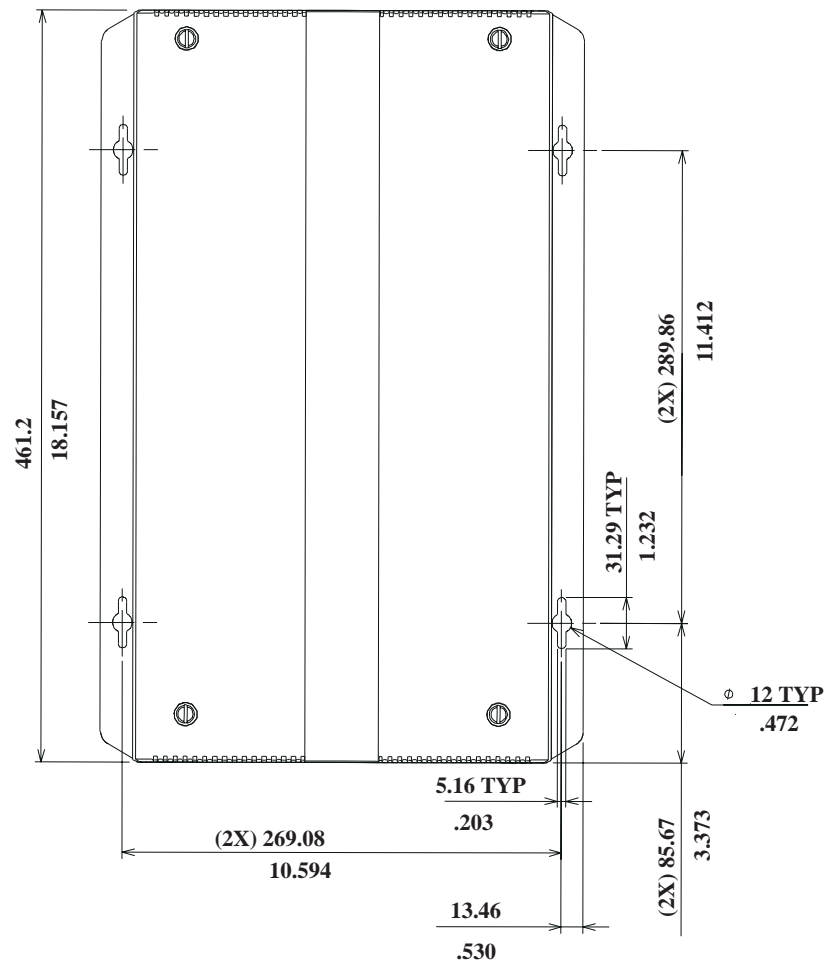


Figure C-2. Top View

Appendix D. Jumpers, Switches, and Pin Assignments

Jumpers are located on the IBM 586 or 586E Single-Board Computer (IBM SBC) to allow you to customize the way your system unit operates. The jumper settings are imprinted on the IBM SBC next to the respective jumpers.

Each jumper covers two of the three pins on a pin block and can be positioned to fit over the center pin and either the pin to the rear or to the front of the center pin.

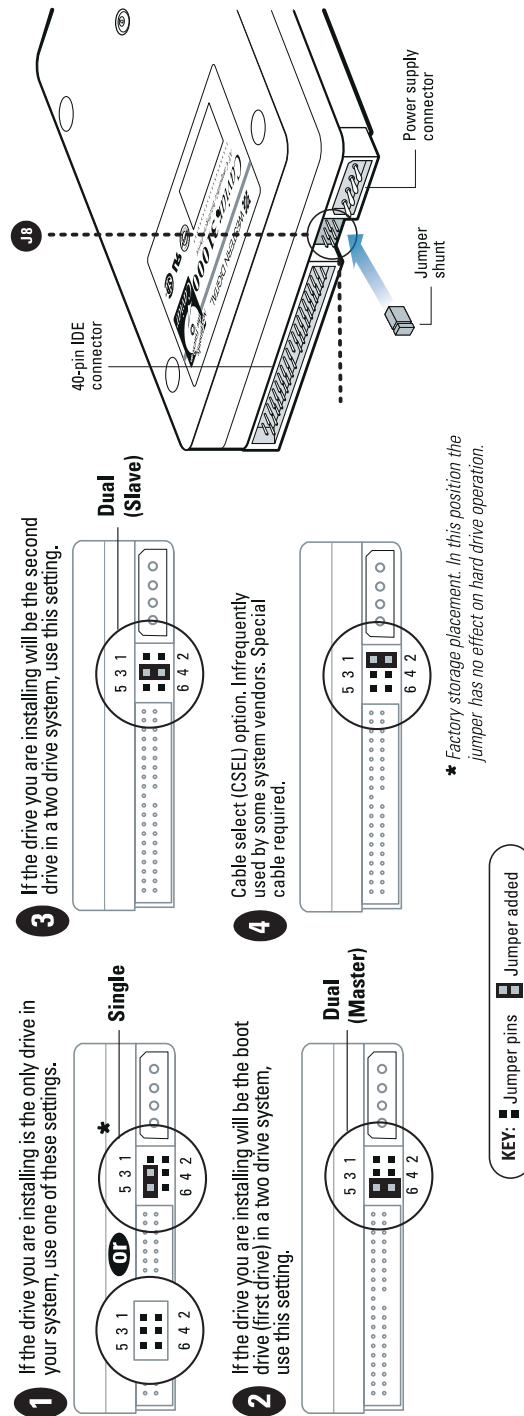
Note: The microprocessor-voltage jumper (5V/3V) is different from the other jumpers on the system board. Depending on the microprocessor installed on the system board, the jumper is either present or is replaced with a voltage-regulator circuit board. This jumper is always present on the IBM SBC.

To change a jumper's position, do the following.

1. Turn off system unit power and disconnect the system unit power cord.
2. Remove the system unit cover.
3. Remove whatever is necessary to gain access to the jumper to be changed.
4. Lift the jumper straight off the pin block.
5. Align the holes in the bottom of the jumper with the center pin and the pin that was not covered previously.
6. Slide the jumper fully onto these pins.
7. Reassemble the components that were removed, and install the system unit cover.
8. Reconnect the system unit power cord.

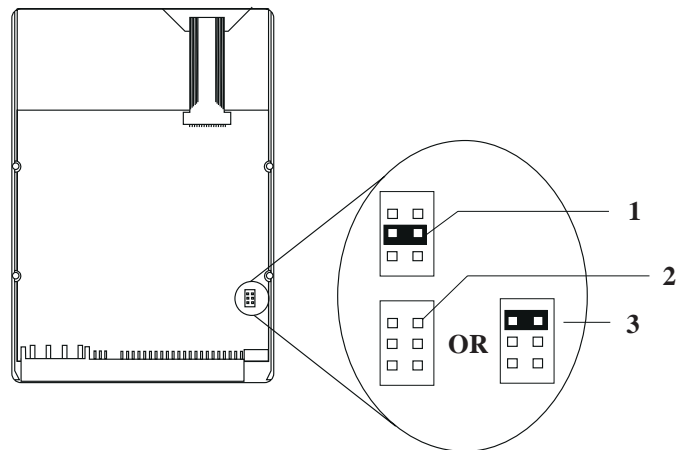
Hard Disk Drive Jumper Settings

Hard disk drives use jumpers to set the drives as primary (master) or secondary (slave). If your drive matches the following illustration, use the information in the drawing to set the jumpers.



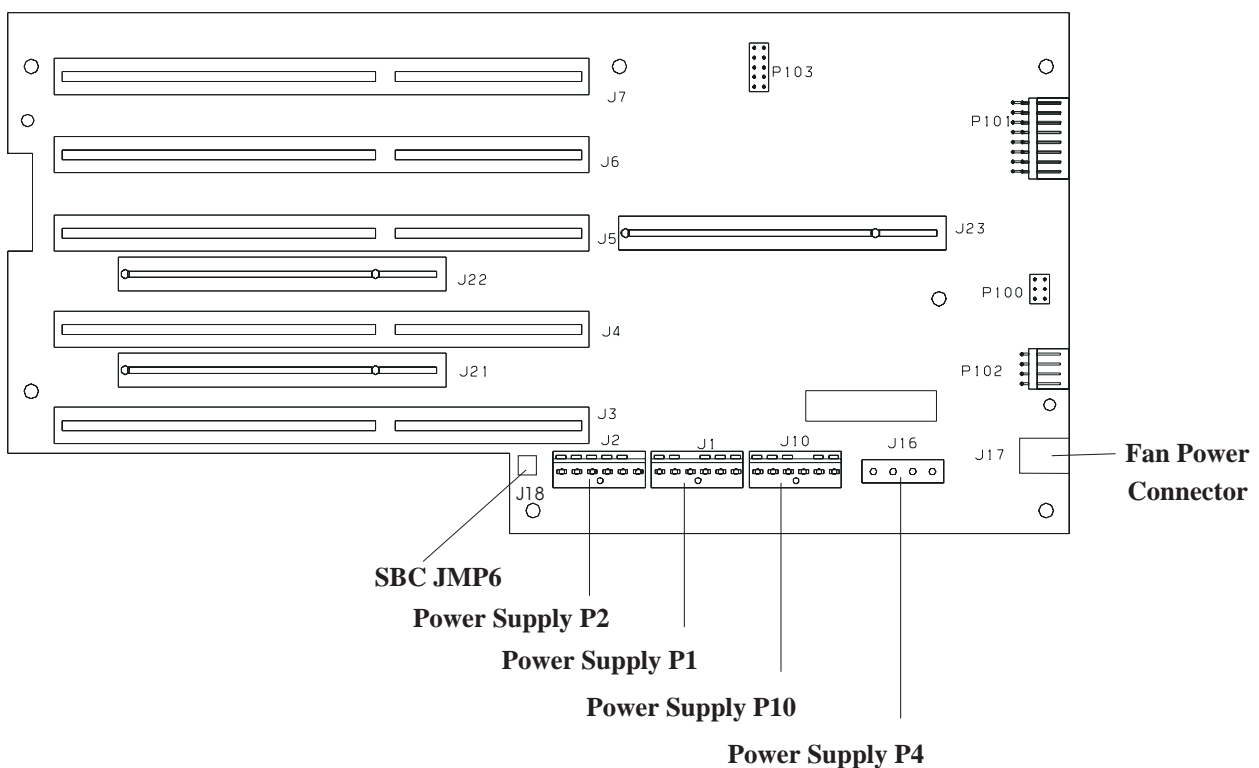
If your drive matches the following illustration and is the primary drive, set the jumper to position **1**.

If your drive is set to the primary setting but you want it to be the secondary drive, you must reset the jumper to either position **2** or position **3**. Position **3** is recommended because it allows you to store the jumper for use in the future.

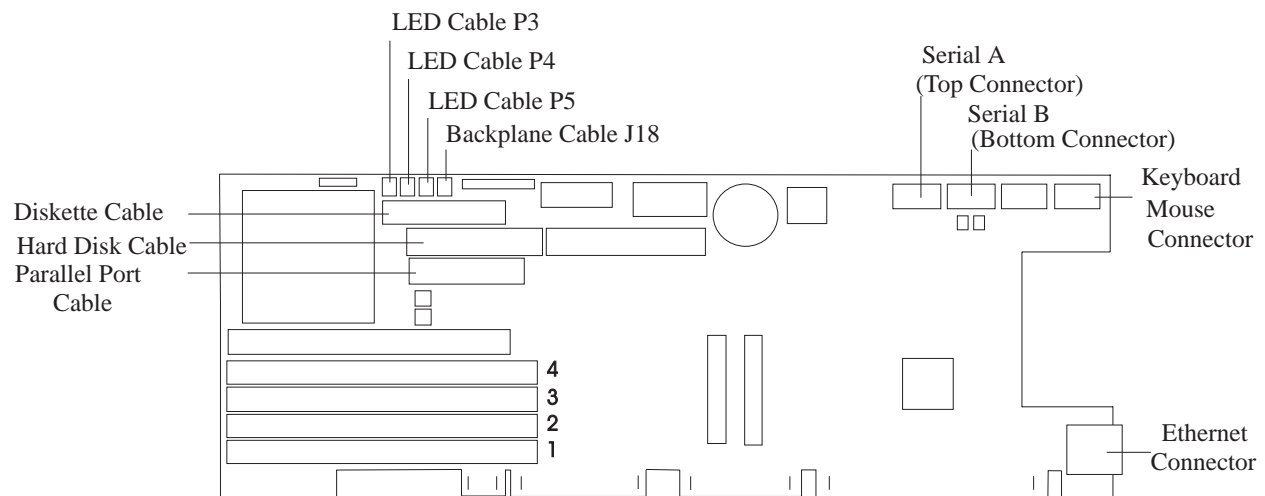


IBM 7587 Industrial Computer Cable Connectors

The following illustration shows the cable connectors on the IBM 7587 Industrial Computer backplane.



The following illustration shows the connectors on the IBM SBC as used in the 7587 Industrial Computer.



IBM SBC Switch Settings

Table D-1. Switch Definitions

1	CPU speed
2	CPU speed
3	Reserved
4	Enable RS-232
5	Auto boot
6	CPU/PCI clock speed #0
7	CPU/PCI clock speed #1
8	Disable video
9	Reserved

Table D-2. Processor Selection

Freq	Switch 1	Switch 2	Switch 6	Switch 7
166MHz	ON	ON	ON	ON
133MHz	ON	OFF	ON	ON
100MHz	OFF	OFF	ON	ON

Serial Port Pin Assignments

Note: See **3** and **4** on Figure 1-3 on page 1-3 for port locations.

Table D-3. Serial Port Pin Assignments

RS-232 Serial A, Serial B		RS-422/485 Serial B
Pin 1	Carrier detect	Receive data (-)
Pin 2	Receive data	Receive data (+)
Pin 3	Transmit data	Transmit data (-)
Pin 4	Data terminal ready	Transmit data (+)
Pin 5	Ground	N/C
Pin 6	Dataset ready	N/C
Pin 7	Request to send	N/C
Pin 8	Clear to send	N/C
Pin 9	Ring indicate	N/C

Appendix E. Interrupt and DMA Assignments

The tables in this appendix outline the interrupt request assignments and direct memory access (DMA) channel assignments for your system unit. If you install industry-standard architecture (ISA)-bus adapters (AT-bus adapters) in your system unit, be sure that no interrupts or DMA channels conflict with existing resources. For example, do not set an ISA adapter to use interrupt 14 (IRQ14) because IRQ14 is used by the IDE hard disk drive.

Interrupt Request Assignments

The following table outlines the interrupt request assignments.

<i>Table E-1. Interrupt Request Assignments</i>	
Interrupt Request	System Resource
NMI	Parity error or channel check
0	Reserved (interval timer)
1	Reserved (keyboard buffer full)
2	Reserved (cascade interrupt from slave PIC)
3	Serial port 2
4	Serial port 1
5	Available (parallel port 2, or can be used by either AT- or PCI-bus adapters) (see Note 2)
6	Diskette drive
7	Parallel port 1
8	Real-time clock
9	Available (can be used by either AT- or PCI-bus adapters) (see Note 2)
10	Available (can be used by either AT- or PCI-bus adapters) (see Note 2)
11	Onboard Ethernet (optional)
12	Mouse port, if enabled; otherwise, it is available
13	Reserved (math coprocessor)
14	IDE hard disk drives
15	Alternate IDE hard disk drives

Notes:

- Abbreviations:
 - NMI = non-maskable interrupt
 - PCI = peripheral component interface
 - PIC = programmable interrupt controller
- For interrupts 5, 9, 10, and 11, at least one must be available for PCI adapters if any PCI adapters are installed. Interrupt 9 can be used as the vertical retrace interrupt by some software, so it might not always be available.

DMA Channel Assignments

The following table outlines the DMA channel assignments.

<i>Table E-2. DMA Channel Assignments</i>		
DMA Channel	Data Width	System Resource
0	8 bits	Available
1	8 bits	Available
2	8 bits	Reserved (diskette drive)
3	8 bits	Available (used by parallel port when in extended capabilities (ECP) mode)
4		Reserved (cascade channel)
5	16 bits	Available
6	16 bits	Available
7	16 bits	Available